

What is claimed is:

1. In a medical device system having a plurality of monitoring elements, a method for phase shifting neurological signals received from the monitoring element comprising the steps of:

(a) receiving a first neurological signal from a first monitoring element and a second neurological signal from a second monitoring element;

(b) sampling the first and second neurological signals at different time instances resulting in a time shift between the first and second neurological signal samples; and

(c) time shifting signal samples of the second neurological signal to correct for the time shift so the second neurological signal is synchronized with the first neurological signal.

2. The method of claim 1, further comprising the step of:

(d) utilizing the first neurological signal and the time-shifted second neurological signal to provide closed-loop feedback control of a treatment therapy.

3. The method of claim 1, further comprising the step of:

(d) time shifting each additional received neurological signal relative to the first neurological signal.

4. The method of claim 1, wherein the step of receiving comprises the step of receiving neurological signals selected from the group consisting of an electrical signal, a chemical signal, a biological signal, a temperature signal, a pressure signal, a respiration signal, a heart rate signal, a ph-level signal, and a peripheral nerve signal.

5. The method of claim 1, wherein the step of receiving comprises the step of receiving the neurological signals from monitoring elements selected from the group consisting of an electrode and a sensor.

6. The method of claim 1, wherein the step of processing comprises the step of computing the time shift by solving a polynomial curve fit equation based on the signal samples.

7. The method of claim 6, wherein the step of computing comprises the step of solving a polynomial curve fit equation selected from the group consisting of a parabolic equation, a linear equation, and a cubic equation.

8. A medical device system capable of phase shifting neurological signals to provide closed-loop therapeutic treatment of a nervous system disorder comprising in combination:

- (a) at least one monitoring element, each generating a neurological signal of a sensed neurological condition;
- (b) a therapy device providing treatment therapy to the patient in response to the sensed neurological condition; and
- (c) computer executable instructions for performing the steps of (i) receiving a first neurological signal from a first monitoring element and a second neurological signal from a second monitoring element; (ii) sampling the first and second neurological signals at different time instances causing a time shift between the first and second neurological signals; and (iii) time shifting signal samples of the second neurological signal so the second neurological signal is synchronized with the first neurological signal.

9. The medical device system of claim 8, wherein the nervous system disorder is selected from the group consisting of a disorder of a central nervous system, a disorder of a peripheral nervous system, and mental health disorder, and psychiatric disorder.

10. The medical device system of claim 8, wherein the nervous system disorder is selected from the group consisting of epilepsy, Parkinson's disease, essential tremor, dystonia, multiple sclerosis (MS), anxiety, a mood disorder, a sleep disorder, obesity, and anorexia.

11. The medical device system of claim 8, wherein the treatment therapy is selected from the group consisting of electrical stimulation, magnetic stimulation, drug infusion, and brain temperature control.

12. The medical device system of claim 8, wherein the neurological signal is selected from the group consisting of a electrical signal, a chemical signal, a biological signal, a temperature signal, a pressure signal, a respiration signal, a heart rate signal, a ph-level signal, and a peripheral nerve signal.

13. The medical device system of claim 8, wherein the monitoring element is selected from the group consisting of an electrode and a sensor.

14. The medical device system of claim 8, wherein the medical device system is selected from the group consisting of an external system, a hybrid system, and an implanted system.

15. The medical device system of claim 8, wherein the computer executable instructions are further configured to perform the step of: (iv) utilizing the first neurological signal and the time-shifted second neurological signal to provide closed-loop feedback control of a treatment therapy.

16. The medical device system of claim 8, wherein the computer executable instructions are further configured to perform the step of: (iv) time shifting each additional received neurological signal relative to the first neurological signal.

17. The medical device system of claim 8, wherein the step of processing comprises the step of computing the time shift by solving a polynomial curve fit equation based on the signal samples.

18. The medical device system of claim 17, wherein the step of computing comprises the step of solving a polynomial curve fit equation selected from the group consisting of a parabolic equation, a linear equation, and a cubic equation.